ORAL ABSTRACTS

DIAGNOSTIC ERRORS IN MEDICINE: VIEW FROM THE FRONT LINES - THE PATIENTS' PERSPECTIVE

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Background: Individuals at the front lines of care can potentially provide valuable insights on diagnostic errors. We sought to ascertain patients' perspectives on diagnostic error-related contributory factors and prevention strategies.

Methods: We conducted in-depth interviews with 35 participants who either personally experienced (n=22) or witnessed a diagnostic error of a family member (n=13). Participants described their experiences and identified diagnostic error-related contributing factors and prevention strategies. Using grounded theory methodology, two reviewers independently coded transcripts and identified recurring themes. To facilitate analysis, we created graphical timelines for certain interviews to depict diagnostic process breakdowns and illustrate patient and provider actions and key events.

Results: Some of the predominant contributory factors for errors according to patients included providers anchoring on an incorrect diagnosis early in the process; not listening to patients' complete medical history; lack of investigation despite the presence of symptoms; not viewing the patient holistically; lack of care coordination across multiple providers; disease demographic biases; unfair patient stereotyping and health insurance restrictions. Some patients indicated not seeking timely healthcare might have contributed to their delayed diagnosis. Many patients researched their symptoms on the Internet and reviewed medical literature and manuals, arriving at a diagnosis determined to be the definitive diagnosis. When presenting their findings, they often felt providers quickly dismissed their views. Patients wanted to participate in the diagnostic process, but often felt unheard and disrespected when asking questions or offering suggestions. Patients reported that diagnostic errors could be prevented if providers "listen to the patient" while taking the medical history and be open to their suggestions regarding tests and potential diagnoses; think outside the box and consider a wider range of possibilities for their symptoms; investigate rather than automatically assume an undiagnosed mental health issue; follow-up on test results promptly and shift to a team-based care paradigm. After the event several patients provided feedback to providers who missed the diagnosis; however, many indicated they were too emotionally laden to do so. Most patients and family members suffered significant and long-lasting emotional and/or financial effects. Patients and their families want accountability and found an apology helped them cope.

Conclusion: Patients and family members who have experienced a diagnostic error can offer valuable insights on the diagnostic process and identify specific contributory factors and preventive strategies. Our findings should encourage health care institutions and providers to engage with patients as a source of learning and prevention of diagnostic errors.

VIDEO REVIEW PRODUCES INSIGHT INTO DIAGNOSTIC ERRORS

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Statement of problem: Current standards in event review and performance improvement utilize retrospective analysis and participant memory to reconstruct events and identify missed opportunities. We know from research in other domains that eyewitness accounts are flawed.

Description of the intervention or program: In December 2011, for quality improvement purposes, video cameras were placed in every room in our 26-bed pediatric Cardiac Intensive Care Unit. Only 1 room (which also functions as a simulation room) has audio capability. These videos are stored on a password-protected server for 20-30 days (based on available server space) and then automatically deleted. The videos have a privacy mode which family members and staff are empowered to activate when desired. Our video review program has evolved to our current program which involves one on one "coaching sessions" where any staff member can review any event with a "coach" of his/her choosing. Coaches are made up of Critical Care Faculty and Nursing Educators. In addition, all serious events identified by staff for our weekly critical event review are reviewed by a core group of 2 critical care faculty and 2 nurses (1 nurse practitioner and 1 nurse educator). This information is used to clarify event timelines. After explicit consent is obtained from all parties in videos, selected events thought to have especially revealing or insightful behaviors are shown to staff.

Findings to date: Since its inception, we have discovered several trends in human behavior patterns and have changed our educational initiatives to address these: 1. The power of expectation- Unexpected cardiac arrest leads to a delay in chest compressions of up to 7 minutes even when video and monitor evidence of cardiac arrest is clear. Repetitive behaviors such as listening to breath sounds and checking for a pulse are done while bag mask ventilation is started but there seems to be a psychological

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hurdle difficult to overcome when cardiac arrest is unexpected. 2. Bystander effect- When other staff enter the room for a non patient related purpose, the primary caregiver is falsely reassured if those staff do not express concern. Staff entering the room do not realize they are providing reassurance. 3. Distinguishing an abnormal rhythm from a baseline abnormal rhythm is difficult for the non-expert. Malignant arrhythmias including ventricular tachycardia are difficult to diagnose when the baseline arrhythmias are not familiar for the staff.

Lessons learned: Video review allows us to gain insights into the behaviors of medical personnel in the midst of a medical crisis. This deserves further investigation.

INTERNAL MEDICINE AND EMERGENCY MEDICINE RESIDENTS' PERCEPTIONS OF OUTCOME FEEDBACK AFTER HANDOFFS

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Background: Learning patient outcomes after forming assessments and plans is recognized as being crucial for calibrating diagnostic and therapeutic decision-making, but handing off patients to other care teams frequently disrupts this process. This lack of feedback may be especially problematic to physicians in training, although resident perspectives on post-handoff outcome feedback are not well understood.

Methods: We conducted a web-based nine-item survey of internal medicine and emergency medicine residents at our institution to study how often they find out about patients they have handed off, methods that they use to obtain feedback, their perceptions on the value in learning such outcomes, and the barriers to doing so. The first eight questions were scored on five-point Likert scales and the final item allowed for comments.

Results: Seventy-eight of 149 residents responded to our survey, for a 52.3% response rate. 73% responded that they only "sometimes" or "rarely" find out the outcomes of patients they have handed off, although 95% said learning outcomes was "moderately" or "very important" to both their education and job satisfaction. 84.6% were not satisfied with current systems of learning outcomes of patients after handoffs. The main barriers cited were too little time and lack of a reliable system to track prior patients.

Conclusion: Despite perceived importance of learning outcomes after handoffs, the majority of residents cite difficulty with obtaining such information. This study demonstrates that providing feedback on patient outcomes, which would help with future diagnostic decision-making, would meet a recognized need among physicians in training.

PATIENT-INITIATED SECOND OPINIONS FOR DIAGNOSIS AND TREATMENT: AN EVALUATION OF OUTCOMES OF A NATIONAL PROGRAM

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Background: One in five patients seek second opinions, an intervention that might prevent diagnostic/treatment errors. However, unlike in radiology and pathology, the impact of formal second opinions in general clinical practice has not been evaluated. We examined outcomes of a patient-initiated second-opinion program, specifically evaluating changes in diagnosis and treatment, estimated clinical impact, and patient satisfaction.

Methods: The nationally-administered second-opinion program, an employment benefit, allows employees to request second opinions at no additional cost. Program staff perform clinical intakes and obtain patients' entire medical records, including notes, tests (laboratory, pathology, and imaging) and procedures performed. Trained physicians summarize the cases and identify key, unresolved clinical questions. For each case, all diagnostic data and key questions are forwarded to expert specialists. Experts' recommendations are synthesized and given to patients to review with their physicians. The outcomes of these second opinions are graded by trained nurses who determine whether initial diagnoses and treatment recommendations were confirmed, clarified, or changed; and trained physicians who assess whether estimated clinical impact is none, minor, moderate, or major. One to two weeks after discussing recommendations with program experts, patients are invited to complete satisfaction surveys. A research team aggregated and independently analyzed data from all patient-initiated second opinions from 2011 and 2012.

Results: In the evaluation period, 6,791 patient-initiated second opinions were completed. These resulted in changes in diagnosis in 15%; confirmation in 57%, and clarification in 17% of cases. Impact on diagnosis was moderate or major in 22% of cases. Second opinions resulted in changes in treatment in 37%; confirmation in 27%, and clarification in 27% of cases. Impact on treatment was moderate or major in 32% of cases. 41% of cases had recommended changes in either diagnosis or treatment; 11% had changes in both. 93% of patients were satisfied with the experience, 90% said their

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questions were answered, 84% discussed results with their doctors, and 88% were more confident in their diagnoses/treatments. However, only 61% planned to follow the given recommendations.

Conclusion: A national program providing patient-initiated second opinions recommended moderate or major changes in diagnosis or treatment for over one-third of participants. This suggests significant diagnostic and treatment variability in real-world clinical practice, and a potential role for second opinions in preventing diagnostic and treatment errors. Although patient satisfaction with the program was high, further evaluation is needed to determine whether second opinions impact clinical outcomes, including the reduction of diagnostic errors.

VALIDATION OF AN INSTRUMENT TO ASSESS CLINICAL REASONING DURING ORAL CASE PRESENTATIONS ON BEDSIDE ROUNDS

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Statement of problem: Diagnostic errors are a major threat to patient safety, but effective strategies to develop clinical reasoning expertise among trainees are lacking. Oral case presentations provide trainees an opportunity to engage in deliberate practice to build expertise in clinical reasoning. There are insufficient tools currently available to allow faculty to provide structured feedback to enhance clinical reasoning.

Description of the intervention or program: We established content and response validity for a tool to provide feedback to trainees on their communication and clinical reasoning skills during oral case presentations during bedside rounds. Our diagnostic reasoning framework for oral case presentations, "PBEAR" (Problem representation, Background Evidence, Analysis, Recommendation), analogous to "SBAR" (Haig, 2006), is based upon "Elaborated knowledge" using "Problem Representation" (Bordage, 1994) and "Illness Scripts"(Bowen, 2006). The "PBEAR Oral Case Presentation Tool" encourages case presentations that differ from the standard framework in that learners begin the presentation with a "Problem representation" to share their mental model at the outset. The "Background Evidence" encourages learners to filter data from EMR documentation for relevance based upon their mental model. The "Analysis" section encourages comparing and contrasting of the patient's findings with 2-3 known illness scripts. Learners are directed to identify and explain data that doesn't fit well. The "Recommendation" is a problem-based plan.

Findings to date: We used feedback from clinical reasoning workshops at national meetings from >100 hospitalists to establish construct validity for a draft of our tool. We then sent it to 10 pediatric hospitalists who had publications regarding clinical reasoning to assess content validity. After recommended additions, deletions or changes to the scoring rubric we piloted the tool with 10 medical students who agreed to have their presentations recorded and received feedback using the tool. After endorsement of the tool's usefulness by students we established response validity with 10 different hospitalist educators by having them rate an oral case presentation video and then discuss their scoring rationale aloud. We further modified the tool to improve ease of use. We are in the process of establishing internal reliability using faculty ratings of 3 videos designed to depict below average, good and ideal presentations embedded in an e-Learning module to teach the "PBEAR" framework.

Lessons learned: Pilot group students appreciated the structured, specific feedback from faculty using the tool to allow them to deliberately practice improving their clinical reasoning during case presentations, while faculty found it easy to use.

VIDEO-OCULOGRAPHY TO REDUCE STROKE MISDIAGNOSIS AMONG ACUTELY DIZZY PATIENTS: A COST EFFECTIVENESS ANALYSIS OF THE 'EYE ECG'

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Background: Dizziness and vertigo account for over 4 million annual US emergency department (ED) visits at a societal cost of more than $9 billion for ED assessment and post-admission inpatient care. Most have benign vestibular or cardiovascular causes, but ~4% have stroke or transient ischemic attack (TIA). Roughly 35% of these cerebrovascular events are missed, and misdiagnoses often result in disability or death. Recent studies suggest bedside eye exam ('HINTS') is more accurate than MRI. Portable video-oculography (VOG) devices measuring these eye movements have been tested for preliminary accuracy. Before conducting large-scale clinical trials of VOG-based diagnosis, we sought to model the cost effectiveness of this approach relative to current practice and other

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alternatives for stroke diagnosis in ED patients with acute dizziness.

Methods: Cost-effectiveness analysis from the societal perspective. Combining literature and expert-derived estimates of probabilities and utilities with local hospital variable cost estimates, we constructed a decision model to compare current national ED diagnostic practice with four other hypothetical diagnostic strategies. Our base case was a 65 year-old in average health without disability presenting acute, continuous dizziness (>24hrs, at high risk for stroke). We assessed current practice versus VOG and three non-selective diagnostic alternatives ("CT all", "MRI all", "admit all"). Outcome measures were cost, quality-adjusted life-years (QALYs), and incremental cost-effectiveness ratios ($/QALY). We also estimated potential national cost savings from reduced overtesting in patients with benign vestibular disorders.

Results: Applying VOG operating at 99% sensitivity and 97% specificity ($7,735/QALY) or "MRI all" ($12,200/QALY) would improve stroke outcomes and be highly cost effective. "CT all" would be less effective and "admit all" would not be cost effective ($190,000/QALY beyond "MRI all"). Results were sensitive to VOG accuracy, baseline prevalence of cerebrovascular events, and post-event life expectancy. Potential national cost savings from reduced overtesting in benign vestibular disorders would be ~$1 billion per year (half from reducing unnecessary CT, half from reducing unnecessary inpatient admissions).

Conclusion: Bedside VOG ('eye ECG') could reduce stroke misdiagnosis and improve clinical outcomes among acutely dizzy patients at minimal societal cost. Improved diagnosis is cost effective but not cost saving with respect to stroke because correct stroke care (hospitalization) to deliver better patient outcomes increases costs, and more strokes are identified by VOG than current care. Implementing such an approach as part of broader diagnostic strategy in acute dizziness, could, however, save approximately $1 billion per year.

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